

IN THE CLAIMS:

1. (Currently amended) A method of backup and restore procedure using a first storage subsystem and second storage subsystem which are connected to each other via a path, the first storage subsystem connected to a first host, the second storage subsystem connected to a second host, the method comprising the steps of:

performing a backup procedure comprising the steps of:

providing a first logical volume in to the first storage subsystem and a second logical volume and a third logical volume in the second storage subsystem, the second logical volume being a copied logical volume of the first logical volume, the first and second logical volumes being in sync state, the third logical volume being a copied logical volume of the second logical volume, the second and third logical volumes being in sync state; and

splitting the second logical volume and the third logical volume from the first host by a command from the first storage subsystem; and

performing a restore procedure comprising the steps of:

mounting the third logical volume to the second host,

reading, at the second host, a file to be restored from the third volume,

writing, at the second host, the file to the second volume, and

re-synchronizing the first volume with the second volume.

2. (Original) The method of claim 1, wherein

performing a restore procedure further comprises:

recovering a database onto the first volume, if a database application is being run on the first host.

3. (Original) The method of claim 1, wherein

re-synchronizing the first volume with the second volume

further comprises:

determining from a pending data bitmap data on the second volume to be copied to the primary volume.

4. (Original) The method of claim 1, further comprising

marking write data arriving after the command in a pending data bitmap, thereby tracking which data has been modified.

5. (Original) The method of claim 1, wherein the command comprises identities of one or more files to be restored from the third volume and written to the second volume, and wherein

reading, at the second host, a file to be restored from the third volume and writing, at the second host, the file to the second volume, further comprises:

reading exclusively the files specified in the command from the third volume and writing the files so read to the second volume.

6. (Currently amended) A method, comprising: receiving an indication of files to be restored; determining whether the files to be restored comprise contents of an entire volume, and if so:

splitting remote mirrors existing between the production volumes and backup volumes;

resynchronizing local mirrors existing between the backup volumes and volumes holding data copied from the backup volumes; and

resynchronizing remote mirrors for the production volumes and the backup volumes.

7. (Original) The method of claim 6, wherein resynchronizing local mirrors existing between the backup volumes and volumes holding data copied from the backup volumes comprises:

comparing a pending bitmap for the backup volume with a pending bitmap for the volume holding data copied from the backup volume to determine a set of differential data; and

copying the differential data from the volume holding data copied from the backup volume to the backup volume.

8. (Original) The method of claim 6, wherein  
resynchronizing remote mirrors for the production volumes and the backup  
volumes comprises:

comparing a pending bitmap for the production volume with a pending bitmap for  
the backup volume to determine a set of differential data; and  
copying the differential data from the backup volume to the production volume.

9. (Currently amended) An apparatus, comprising:  
means for receiving an indication of files to be restored;  
means for determining whether the files to restore comprise contents of an entire  
volume;

means for splitting remote mirrors existing between the production volumes and  
backup volumes;

means for resynchronizing local mirrors existing between the backup volumes and  
volumes holding data copied from the backup volumes; and

means for resynchronizing remote mirrors for the production volumes and the  
backup volumes.

10. (Currently amended) A method of restoring a file to a first storage  
subsystem connected to a first host from a second storage subsystem connected to a second host,  
in accordance with a request from the first host, wherein:

the first storage subsystem and second storage subsystem are connected to each  
other via a path, the first storage subsystem stores a first logical volume, the second storage  
subsystem stores a second logical volume and a third logical volume, the second logical volume  
being a copied logical volume of the first logical volume, the third logical volume being a copied  
logical volume of the second logical volume, the first logical volume and the second logical  
volume being in a non-sync state, the second and third logical volumes being in sync state,

the method comprising:

mounting the third logical volume to the second host,  
reading, at the second host, a file to be restored from the third volume and  
writing, at the second host, the file to the second volume, and

re-synchronizing the first volume with the second volume.

11. The method of claim 10, wherein:  
mounting the third logical volume to the second host comprises:  
responsive to a command from the first storage subsystem, splitting the sync state  
between the second logical volume and the third logical volume.

12. (Original) A storage subsystem, comprising:  
a first logical volume,  
a second logical volume, and  
an interface to a path providing connectivity to a primary storage subsystem,  
the second logical volume being a copied logical volume of the first logical  
volume,

the first logical volume operative to be selectively placed into one of a sync state  
and a non-sync state with a logical volume in a primary storage subsystem,

the first logical volume and second logical volume being in sync state,  
the second logical volume operative to permit host access to read files to be  
restored from the second logical volume and write the files to be restored to the first logical  
volume responsive to a restore command, and

the second storage subsystem operative to establish a sync state between the first  
logical volume and the second logical volume.

13. (Currently amended) A computer program product, comprising:  
code for receiving an indication of files to be restored;  
code for determining whether the files to be restored comprise contents of an  
entire volume, and if so invoking a plurality of codes, comprising:  
code for splitting remote mirrors existing between the production volumes and  
backup volumes;  
code for resynchronizing local mirrors existing between the backup volumes and  
volumes holding data copied from the backup volumes;

code for resynchronizing remote mirrors for the production volumes and the backup volumes; and

a computer readable storage medium that holds the codes.

14. Canceled

15. Canceled

16. (Original) An apparatus, comprising:

means for receiving a command;

means for splitting a sync state existing between a second storage means and a third storage means;

means for making information on the third storage means available for reading;

means for reading a file to be restored from the third storage means;

means for writing the file to the second storage means; and

means for re-synchronizing the second storage means with a first storage means.

17. (Original) The apparatus of claim 16, wherein

means for making information on the third storage means available for reading further comprises means for mounting the third storage means to a means for processing information stored by the third storage means.

18. (Original) A computer program product, comprising:

code for receiving a command;

code for splitting a sync state existing between a second storage unit and a third storage unit;

code for making information on the third storage unit available for reading;

code for reading a file to be restored from the third storage unit;

code for writing the file to the second storage unit;

code for re-synchronizing the second storage unit with a first storage unit; and

a computer program product that holds the codes.

19. (Original) A system, comprising:  
a first storage subsystem connected to a first host,  
a second storage subsystem connected to a second host, wherein:  
the first storage subsystem and the second storage subsystem are connected to  
each other via a path, the first storage subsystem stores a first logical volume, the second storage  
subsystem stores a second logical volume and a third logical volume, the second logical volume  
being a copied logical volume of the first logical volume, the third logical volume being a copied  
logical volume of the second logical volume, the first logical volume and the second logical  
volume being in a non-sync state, the second and third logical volumes being in sync state, the  
second storage subsystem operative to mount the third logical volume to the second host  
responsive to a restore command, the host operative to read files to be restored from the third  
volume and write the files to be restored to the second volume, and the second storage subsystem  
operative to establish a sync state between the first logical volume and the second logical  
volume.

20. Canceled.